

## **CHAPTER 6**

### **ARITHELP DESIGN**

This chapter describes the interface design in the ARITHELP. Section 6.1 looks at the concept of intelligent interface. Section 6.2 briefly discusses the process of ARITHELP interface design. Section 6.3 describes the type of screens involved in designing the ARITHELP interface. Section 6.4 highlights the screen design of the ARITHELP. Section 6.5 discusses the interaction method applied in the ARITHELP. Section 6.6 discusses the navigation provided in the ARITHELP. Section 6.7 looks at the different types of ARITHELP feedback format. Section 6.8 highlights the devices involved for interaction between the user and the system.

#### **6.1 INTELLIGENT INTERFACE**

The step which follows after completing and analyzing the data collected is to design the system. During the system design, an information system that satisfies the requirements specified in the system requirements document during the systems analysis is designed. The goal is to design an information system that will be effective, reliable and maintainable. To be effective, the system must satisfy the defined requirements and meet the specified constraints. The design of the help system is followed by general design principles:-

1. Help should never be a substitute for good design interface
2. Help should be context sensitive.
3. The presentation of help information should not take the user away from the task at hand
4. Help systems should assist users in framing questions.
5. Answer provided by help should be relevant to the question asked.
6. Help system should be dynamic and responsive.
7. Users should need help to get help.

In order to form an intelligent system; an interface should also be intelligent. Intelligent interface should predict what the user wants to do and present information with this prediction in mind. Intelligent interface can also make a task more intuitive and helpful. Instead of trudging along a task in the mire of an inefficient and clumsy interface, the user might find it helpful and informative to use an intelligent interface. An intelligent interface might have some knowledge of how to get around the system, or tasks a user would want to do. With this knowledge information can be presented by an intelligent interface making navigation and operation more intuitive to the user.

## **6.2 INTERFACE DESIGN**

The interface provides the communication medium between the computer and the users. During the interface design, how the system will appear to the user is defined and the “look and feel” of all system inputs, outputs interface and dialogues is described. Interface design includes the following steps:-

1. Designing forms (hard copy and computer display) which describe how data will appear to users in system inputs and outputs. Forms can be used for both input and output.
2. Designing interfaces dialogue which describe the pattern of interaction between system users and software.

### **6.2.1 The process of designing interfaces and dialogue**

Interface design focuses on how information is provided to and captured from users whereas dialogue design focuses on the sequencing of interface displays. Dialogues are analogous to a conversation between two people. The process of designing interfaces and dialogues is a user-focused activity. In order to design the usable interfaces and dialogues, there are some questions to be answered such as who is the user, what is the system about, where is it be used and how is it implemented. The dialogue diagram of the ARITHELP is indicated in Figure 6.1.

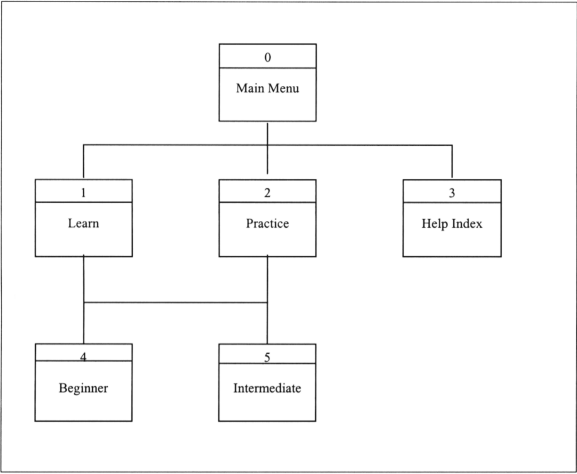


Figure 6.1: Dialogue Diagram of ARITHELP

### 6.3 TYPE OF SCREENS

ARITHELP is developed using window base format. There are three types of screen involved.

1. Main screen
2. Sub screen
3. Dialogue screen

#### 6.3.1 Main screen

The main screen has a full size screen layout. Each screen will have a title. Examples of main screen are Learn (Beginner), Learn (Intermediate), Practice (Beginner), Practice (Intermediate), Help Index and Main Menu. Figure 6.2 shows the main screen.

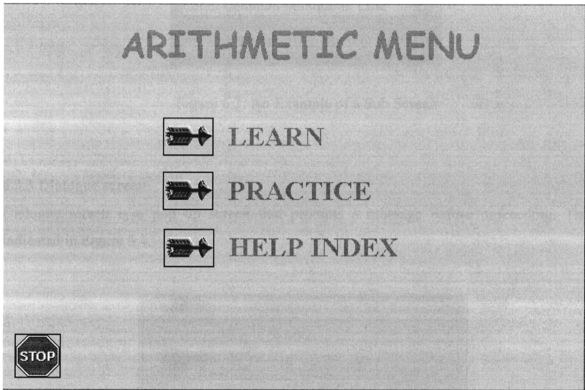


Figure 6.2: The Main Screen

Menu screen displays a list of processing options and allows the end user to select one of the options. Option selection is accomplished by pressing the button displayed.



**6.3.2 Sub screen**

A sub screen is a pop up screen that is displayed when the push button is pressed. For example when the search button is clicked, the list of search item will appear. This is shown in Figure 6.3.

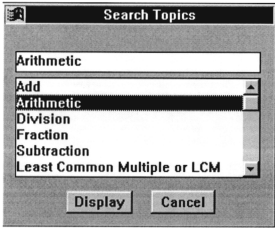


Figure 6.3: An Example of a Sub Screen

**6.3.3 Dialogue screen**

Dialogue screen is a pop up screen that prompts a message before proceeding. This is indicated in Figure 6.4.

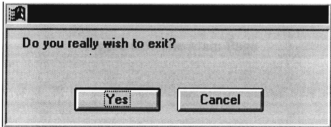


Figure 6.4: An Example of Dialogue Screen

Click YES to proceed and clear the message.

## 6.4 SCREEN DESIGN

### 6.4.1 Main page

This is the first page, which appear in the screen when activating ARITHELP. It briefly describes the content of the system when requested by the user. This page only uses the mouse click as an interaction method between the user and the system. No data need to be entered in this page.

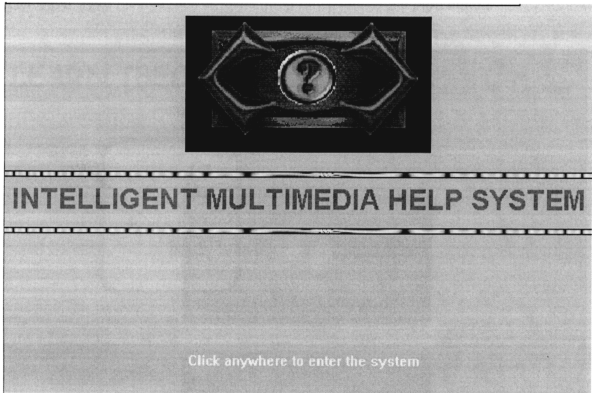


Figure 6.5: The Main Page

6.4.2 Learn page

This page contains different types of arithmetic lesson such as whole number and fraction. It provides learning materials and teaches the lesson depending on the user choice. The user can learn the subject as many time as required and try to answer the questions provided to test their understanding. As the user enters the *Show Method* button, it shows the step-by-step instruction to guide the user to solve the problem. It also provides an animation method in describing some solution as another way to teach the lesson. This page consists of various interaction styles method such as menu (drop-down menu) and push button.

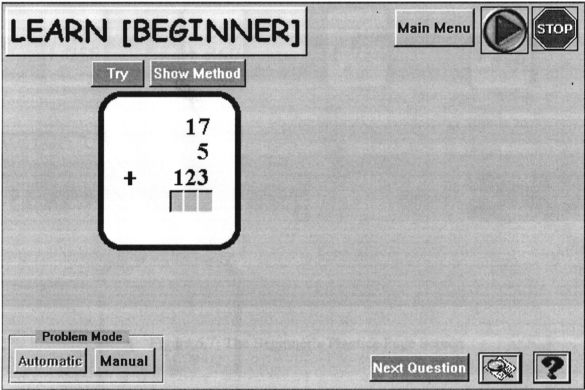


Figure 6.6: The Beginner’s Learn Page Screen

6.4.3 Practice page

The goal of this page is to enable the user to test their understanding of the lesson learned. They can answer the questions according to the lesson selected. ARITHELP will give the feedback as the answer is entered by the user. This page only uses push button as an interaction method.

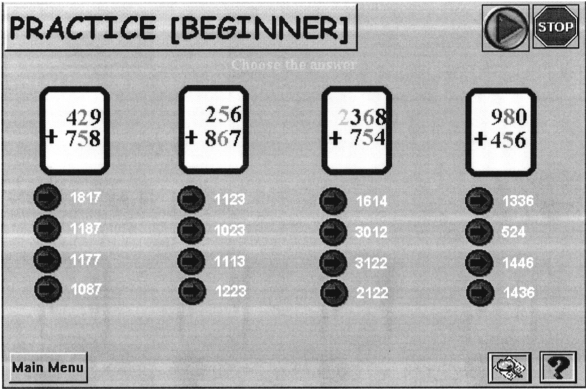


Figure 6.7: The Beginner's Practice Page Screen

6.4.4 Help Index Page

The index page provides the learner with a list of arithmetic concept. The learner may retrieve the information by choosing the index listed using left mouse click. Instead of giving an information, the index also provide an example according to the topic selected.

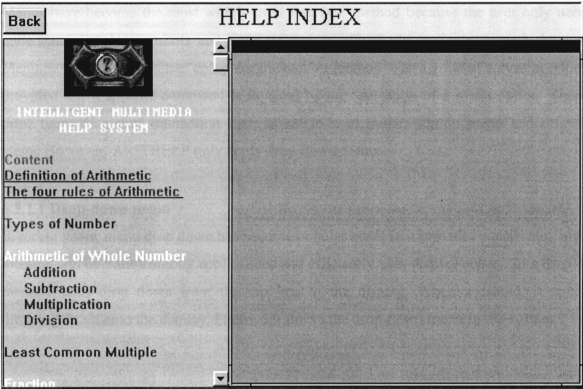


Figure 6.8: The Help Index Page Screen

## **6.5 INTERACTION METHODS**

All human computer interfaces must have interaction styles to support this interaction. This section describes the various interaction methods used in the ARITHELP.

### **6.5.1 Menu Interaction**

Menus have become the most widely used interface method because the user only needs to understand simple snapshots and route options to effectively navigate through the system. Menu interaction is a human computer interaction method where a list of a system options is provided and a specific command is invoked by user selection of a menu option. There are three types of menus interaction such as single-level menu, pop-up menu and drop-down menu. However, ARITHELP only apply drop-down menu.

#### **6.5.1.1 Drop-down menu**

In recent years, menu drop down has become popular because it provides consistency in menu location and operation among applications and efficiently uses display space. In a drop down menu, menus drop down from the top line of the display. When accessed, it opens by dropping down onto the display. Figure 6.9 shows the drop-down menu in the system.

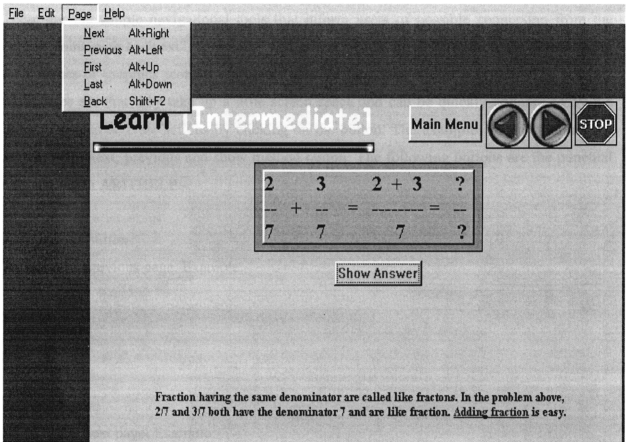


Figure 6.9: An Example of a Drop-Down Menu

## 6.6 NAVIGATIONAL IN ARITHELP

### 6.6.1 Navigation Tools

Navigational tools can be defined as all parts of the interface that are designed to help user choose the relevant information whether to discover the scope of information available or choose a relevant path to get the information needed [De La Passardiére & Dufresne, 1992]. There are two kinds of tools to enable the interactive and intelligent interaction between the users and the system.

### 6.6.1.1 Punctual aids

These are the simple navigational tools that inform users of possible connection from the current point such as "next", "previous" and others which are displayed on the screen using their names or graphics icon. It represents specific functions within a system. The primary advantages are that they take up a little screen space and can be quickly understood by the users. User can activate actions by clicking on the button. The examples of this tool are the search, help, next, previous and show method button. The following buttons are the punctual aids applied in ARITHELP:-

#### 1. Previous button

To go to the previous page. Example:-



#### 2. Next button

To go to the next page. Example:-



#### 3. Search button

To view search items. Example:-



#### 4. Help button

To get help from the system. Example:-





### 5. Exit button

To quit from the system. Example:-



### 6. Main Menu button

To go to main menu. Example:-



#### 6.6.1.2 Structural aids

Structural aids give an overview information on the hyperspace content. For an example: the index that is the hierarchical tool that gives the structure of the hyperspace content.

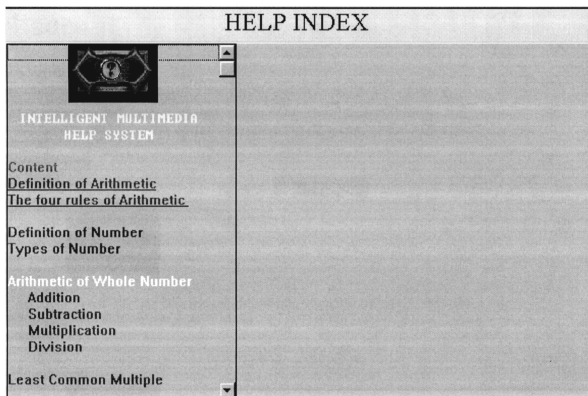


Figure 6.10: The Help Index Screen

6.6.2 Navigational Aids

Several navigational aids have been developed to help users to find the information required without getting lost in the hyperdocument. The navigation aids provided in ARITHELP are backtracking and sneak preview.

6.6.2.1 Backtracking

The backtracking facility allows the user to go back repeatedly until they get to their first page or go forward to the next page. This is represented by the previous and next button provided at the top of each page. The aim is to avoid the user from getting stuck when reaching a page with no outgoing links.

6.6.2.2 Sneak Preview

Sneak Preview provides words or phrases with little information about their destination. Clicking on the word activates the link. This is shown in Figure 6.11.

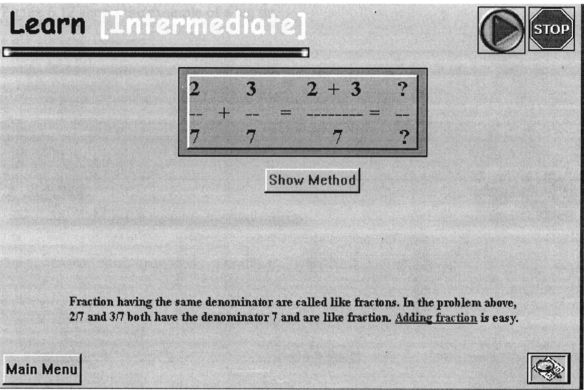


Figure 6.11: The Intermediate Learn Screen

## **6.7 ARITHELP Feedback Format**

ARITHELP feedback capabilities provide immediate knowledge results. There are seven instructional feedback to the student which are help, assistance, empowering, reactive learning, modeling, coaching and tutoring.

### **6.7.1 Help**

The help format allows the student to request assistance when they have made an error or when they need to solve problem. The on-line capability permits the student to learn by doing example at the same time. The student perceives that they have control over the learning process. This capability has a positive impact on the student's acceptance of the system. The help interaction contain in the system is tag tips.

#### **6.7.1.1 Tag tips**

This help interaction provide information about the button which is pointed by the user. User can easily interact with any button without having to split the user manual to find its function. For example, when user pointed a mouse on the search icon, the statement search appeared. Figure 6.12 shows the example of a tag tip.

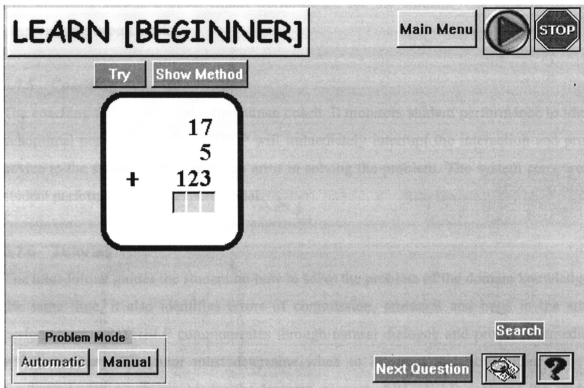


Figure 6.12: The Search Icon Tag

### 6.7.2 Assistance Format

In the assistance format, the intelligent help system assume some of the responsibility for problem solving tasks and allow the student to concentrate on specific areas. The system instructs the task by presenting it's operation in sequence. The student is also provided with an opportunity to apply that operation and eventually generalize the operations in solving similar problem at the practice module. This format facilitates the development of conceptual understanding and encourages higher order thinking skills which are involved in problem solving.

### 6.7.3 Empowering Format

The empowering format provides tools to the student to review their own decision-making processes. The system captures the student performance decisions and their impact and student can view a visual representation of the student problem solving ability. The student can travels through their own decision tree to identify errors or find the solution of problem faced.

#### **6.7.4 Modeling**

The modeling format models expert performance for the student. The student learns by observing the expert work.

#### **6.7.5 Coaching**

The coaching format stimulates the human coach. It monitors student performance to identify suboptimal performance. ARITHELP will immediately interrupt the interaction and provide advice to the student if they make an error in solving the problem. The system compares the student performance to its expert model.

#### **6.7.6 Tutoring**

The tutor format guides the student on how to solve the problem of the domain knowledge. At the same time, it also identifies errors of commission, omission and bugs in the student performance. ARITHELP communicates through natural dialogue and provides remediation when necessary. The tutor must determine when to interrupt and how often. Too little feedback or too much can hinder the learning process. ARITHELP analyzes the student's performance to ensure that the learning process of the domain knowledge is being mastered. There are two types of instructional tutor formats which are expository tutor and procedure tutor.

##### **6.7.6.1 Expository Tutor**

The expository tutor presents factual knowledge with an emphasis on the development of inferential skills. The mode of operation of the expository tutor is through a natural dialogue with the student. Factual knowledge is sequenced to provide a coherent structure to the learning process. The framework establishes a relationship between existing knowledge and general concepts. Instructional dialogue begins with generalities and proceeds to more specific in accordance to the student's request.

##### **6.7.6.2 Procedure Tutor**

The procedure tutor provides instruction on procedural skills that can be generalized to other situations. The procedure tutor emphasizes the development of effective problem solving skills. Information is sequenced in the form of practice exercises and examples which are based on the student accomplishment of specific instructional objectives. Guidance is

provided through the learning process. The guidance is provided in several methods which are audio representation, animation, text and graphics.

## 6.8 DEVICES

In order to interact with the system, there are some hardware devices employed to support the interaction. The following describes the hardware used in the system.

### Keyboard

Users push a button that represents symbols, which are then translated into words and commands. Keyboard is widely understood and provides considerable flexibility for interaction. User needs a keyboard to enter the number to a field provided.

### Mouse

A mouse is a plastic object that users push across a flat surface and whose movements are translated into cursor movement on a computer display. Users need a mouse to push the button within the system.